

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A speech decoder for decoding a coded speech signal into a reproduction speech signal and for reproducing a speech signal ~~by the use of the reproduction speech signal, the decoder comprising~~including:

a spectral parameter calculating circuit, responsive to the reproduction speech signal, for calculating spectral parameters based on the reproduction speech signal;

an excitation signal calculating circuit for calculating an excitation signal and for obtaining a level of the excitation signal, on the basis of the reproduction speech signal and the spectral parameters ~~calculated by the spectral parameter calculating circuit~~;

a smoothing circuit responsive to the spectral parameters and the excitation signal, for smoothing ~~in time~~ at least one of the spectral parameters and the level of the excitation signal, so as to output the spectral parameters and the excitation signal where at least one is subjected to smoothing; and

a synthesis filter circuit having a synthesis filter constructed with the spectrum parameters output from the smoothing circuit, and for synthesizing the excitation signal by using the synthesis filter, so as to reproduce the speech signal;

wherein the excitation signal calculating circuit, the smoothing circuit, and the synthesis filter circuit operate only in compliance with ~~only~~-predetermined conditions.

2. (original): A speech decoder as claimed in claim 1, wherein the excitation signal calculation circuits carries out an inverse-filtering for the reproduction speech signal by the use of the spectral parameters, so as to calculate the excitation signal.

3. (currently amended): A speech decoder as claimed in claim 1, further comprising:
a mode-judging circuit for judging a mode of the reproduction speech signal by extracting feature quantities from the reproduction speech signal,

wherein the predetermined conditions comprises a mode condition that the mode of the reproduction speech signal is judged as a predetermined mode by the mode-judging circuit, ~~the excitation signal calculating circuit,~~ so that the excitation signal calculating circuit, the smoothing circuit and the synthesis filter circuit operate ~~in only~~ when ~~the case where~~ the mode condition is met.

4. (original): A speech decoder as claimed in claim 3, wherein the predetermined mode is silence.

5. (original): A speech decoder as claimed in claim 3, wherein the predetermined mode is “unvoiced sound.”

6. (currently amended): A speech decoder for decoding a coded speech signal into a reproduction speech signal and for reproducing a speech signal ~~by the use of the reproduction speech signal, comprising including:~~

a spectral parameter calculating circuit, responsive to the reproduction speech signal, for calculating spectral parameters based on the reproduction speech signal;

an excitation signal calculating circuit for calculating an excitation signal and for obtaining a level of the excitation signal, on the basis of the reproduction speech signal and the spectral parameters ~~calculated by the spectral parameter calculating circuit;~~

a pitch-prediction circuit ~~which calculates~~ a pitch period from ~~either one of the reproduction speech signal and or the excitation signal, where the pitch-prediction circuit carries out a pitch prediction by the use of the pitch period to produce a pitch prediction signal, and where the pitch-prediction circuit calculates a residual signal by subtracting the pitch prediction signal from the excitation signal;~~

a gain-calculating circuit for calculating a gain of at ~~least~~ ~~least~~ one of the pitch prediction signal and the residual signal both output from the pitch-prediction circuit;

a smoothing circuit responsive to the spectral parameters and the gain, for smoothing ~~in time~~ at least one of the spectral parameters and the gain, so as to output the spectral parameters and the excitation signal where at least one is subjected to smoothing; and

a synthesis filter circuit having a synthesis filter constructed with the spectrum parameters output from the smoothing circuit, the synthesis filter circuit ~~and for newly~~ producing ~~an~~ new excitation signal as a proper excitation signal on the basis of the gain, the pitch prediction signal and the residual signal, and thereby the synthesis filter ~~for synthesizing~~ the proper excitation signal ~~by using the synthesis filter~~, so as to reproduce the speech signal.

7. (original): A speech decoder as claimed in claim 6, wherein the excitation signal calculation circuits carries out an inverse-filtering for the reproduction speech signal by the use of the spectral parameters, so as to calculate the excitation signal.

8. (currently amended): A method of reproducing a speech signal, comprising:

~~first step of~~ decoding a coded speech signal output from a speech coder, so as to produce a reproduction speech signal;

~~second step of~~ calculating spectral parameters based on the reproduction speech signal;

~~third step of~~ calculating an excitation signal and obtaining a level of the excitation signal, ~~on the basis of~~ one of the reproduction speech signal and the spectral parameters;

~~fourth step of smoothing in time~~ at least one of the spectral parameters and the level of the excitation signal, so as to output the spectral parameters and the excitation signal where at least one is subjected to the smoothing; and

~~fifth step of synthesizing the excitation signal by using the synthesis filter~~ constructed with the spectrum parameters from said smoothing, so as to reproduce the speech signal; wherein

the calculating of the spectral parameters, the calculating of the excitation signal, the smoothing, and the synthesizing ~~second to fifth steps~~ are carried out ~~in only a case where~~ when predetermined conditions are met, while the reproduction speech signal is handled as the speech signal ~~when in another case where the~~ predetermined conditions are not met.

9. (currently amended): A reproducing method as claimed in claim 8, wherein 'the ~~third step~~ calculating of the excitation signal is carried out so that the reproduction speech signal is subjected to an inverse-filtering using the spectral parameters, to thereby calculate the excitation signal.

10. (currently amended): A reproducing method as claimed in claim 8, further comprising ~~sixth step of~~ judging a mode of the reproduction speech signal by extracting feature quantities from the reproduction speech signal, wherein the predetermined conditions comprises

a mode condition that the mode of the reproduction speech signal is judged as a predetermined mode.

11. (original): A reproducing method as claimed in claim 10, wherein the predetermined mode is silence.

12. (original): A reproducing method as claimed in claim 10, wherein the predetermined mode is “unvoiced sound.”

13. (original): A method of reproducing a speech signal, comprising:

- first step of decoding a coded speech signal output from a speech coder, so as to a reproduction speech signal;
- second step of calculating spectral parameters based on the reproduction speech signal;
- third step of calculating an excitation signal and obtaining a level of the excitation signal, on the basis of the reproduction speech signal and the spectral parameters;
- fourth step of calculating a pitch period from either the reproduction speech signal or the excitation signal, carrying out a pitch prediction by the use of pitch period to produce a

pitch prediction signal, and subtracting the pitch prediction signal from the excitation signal to calculate a residual signal;

fifth step of calculating a gain of at least one of the pitch prediction signal and the residual signal;

sixth step of smoothing in time at least one of the spectral parameters and the gain, so as to output the spectral parameters and the excitation signal where at least one is subjected to the smoothing; and

seventh step of newly producing an excitation signal as a proper excitation signal on the basis of the gain, the pitch prediction signal and the residual signal, and then, synthesizing the proper excitation signal by the use of the synthesis filter constructed with the spectrum parameters, so that the speech signal is reproduced.

14. (original): A reproducing method as claimed in claim 13, wherein the third step is carried out so that the reproduction speech signal is subjected to an inverse-filtering using the spectral parameters, to thereby calculate the excitation signal.